Stoller
Hanford Office

DOE-EM/GJ764-2004

299-E13-07 (A5855)
Log Data Report

Borehole Information:

Borehole: 299-E13-07 (A5855)			**Site:** 216-B-20 Trench		
Coordinates (WA St Plane)		**GWL[1] (ft) :** 346.1		**GWL Date:**	10/26/04
North (m)	**East (m)**	**Drill Date**	**Ground Level Elevation (ft)**	**Total Depth (ft)**	**Type**
134339.288	573405.332	06/56	747.28	367	Cable

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded Steel	2.4	6 5/8	6	5/16	2.4	158
Threaded Steel	0	unknown	8	unknown	0	367.0

Borehole Notes:

The logging engineer measured the 6-in. casing and stickup using a steel tape. Measurements were rounded to the nearest 1/16 in. The 8-in. casing was not visible at the ground surface. Casing depths are derived from *Hanford Wells* (Chamness and Merz 1993), which reports the 6-in. casing was placed on a packer at 158 ft. The 6-in. and 8-in. casings were perforated, and grout emplaced between the casings. The 8-in. casing was also perforated between 323 and 363 ft. The logging engineer measured the groundwater level at 346.1 ft from the TOC. The depth to water was measured at 345 and 337.9 ft (reference depth unknown) in 1956 and 1992, respectively.

Logging Equipment Information:

Logging System:	Gamma 1E		**Type:**	SGLS (70%) SN: 34TP40587A
Calibration Date:	01/04	**Calibration Reference:**	GJO-2004-568-TAC	
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3 Repeat	4	
Date	10/25/04	10/26/04	10/28/04	10/28/04	
Logging Engineer	Spatz	Spatz	Spatz	Spatz	
Start Depth (ft)	150.0	345.0	200.0	164.0	
Finish Depth (ft)	3.0	165.0	165.0	149.0	
Count Time (sec)	100	100	100	100	
Live/Real	R	R	R	R	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	1.0	1.0	1.0	1.0	

Log Run	1	2	3 Repeat	4	
ft/min	N/A[2]	N/A	N/A	N/A	
Pre-Verification	AE012CAB	AE013CAB	AE014CAB	AE014CAB	
Start File	AE012000	AE013000	AE014000	AE014036	
Finish File	AE012147	AE013180	AE014035	AE014051	
Post-Verification	AE012CAA	AE013CAA	AE014CAA	AE014CAA	
Depth Return Error (in.)	- 1	- 3	N/A	- 1	
Comments	No fine gain adjustment.	No fine gain adjustment.	No fine gain adjustment.	No fine gain adjustment.	

Logging Operation Notes:

Spectral gamma logging was performed in this borehole October 25, 26, and 28, 2004. Logging was conducted with a centralizer on the sonde for log runs 2 and 3. Logging data acquisition is referenced to the top of casing. No data were collected below groundwater. A repeat section was collected in this borehole to evaluate system performance.

Analysis Notes:

Analyst:	Henwood	Date:	11/09/04	Reference:	GJO-HGLP 1.6.3, Rev. 0

Pre-run and post-run verifications for the logging system were performed before and after each day's data acquisition. The acceptance criteria were met.

A combined casing correction for 0.6345-in.-thick casing was applied to the log data between 3 and 158 ft. Below 158 ft a correction for 0.322-in.-thick casing was applied.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with an EXCEL worksheet template identified as G1EJan04.xls using efficiency functions and corrections for casing, water, and dead time as determined from annual calibrations. Dead time corrections are applied where dead times exceed 12.7 percent. No correction for water was necessary.

Log Plot Notes:

Separate log plots are provided for the man-made radionuclides detected in the borehole, naturally occurring radionuclides (^{40}K, ^{238}U, ^{232}Th [KUT]), a combination of man-made, KUT, and dead time, and total gamma plotted with dead time. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, casing corrections, or water corrections. Historical gross gamma logs acquired in 1959, 1963, 1968, and 1976 derived from Additon et al. (1978) were re-digitized and included for comparison with the current log data. A repeat log section is also included.

Results and Interpretations:

^{137}Cs, ^{60}Co, ^{154}Eu, and ^{125}Sb were the man-made radionuclides detected in this borehole. ^{137}Cs was detected near the ground surface (maximum concentration of approximately 18 pCi/g), at sporadic locations between 20 and 60 ft (maximum concentration of approximately 6 pCi/g), and at a few isolated locations throughout the borehole near its MDL of approximately 0.2 pCi/g.

^{60}Co was detected at discontinuous depth locations between 40 and 123 ft. The maximum concentration was measured at 0.3 pCi/g at 49 ft.

^{154}Eu was detected between 19 and 30 ft with a maximum concentration of approximately 5 pCi/g at 22 ft.

^{125}Sb was detected at 30 and 32 ft at a concentration of approximately 2 pCi/g.

Historical gross gamma logs showed elevated gamma activity where the detector was saturated, from approximately 20 to 110 ft in this borehole from 1959 to 1963. By 1968, much of the activity below 50 ft had apparently decayed away. The activity has continued to decay away such that the remaining activity lies predominately between 20 and 30 ft. The dominant gamma-emitting radionuclide at this depth is ^{154}Eu. Below 30 ft, the decay is consistent with the existence of short-lived radionuclides such as ^{60}Co (half life of 5.3 years) and ^{125}Sb (half life of 2.8 years), which were both detected by the SGLS at some depth locations in the borehole.

The repeat section indicates good agreement of the naturally occurring KUT.

References:

Additon, M.K., K.R. Fecht, T.L. Jones, and G.V. Last, 1978. *Scintillation Probe Profiles From 200 East Area Crib Monitoring Well*s, RHO-LD-28, Rockwell Hanford Operations, Richland, Washington.

Chamness, M.A., and J.K. Merz, 1993. *Hanford Wells*, PNL-8800, Pacific Northwest Laboratory, Richland, Washington.

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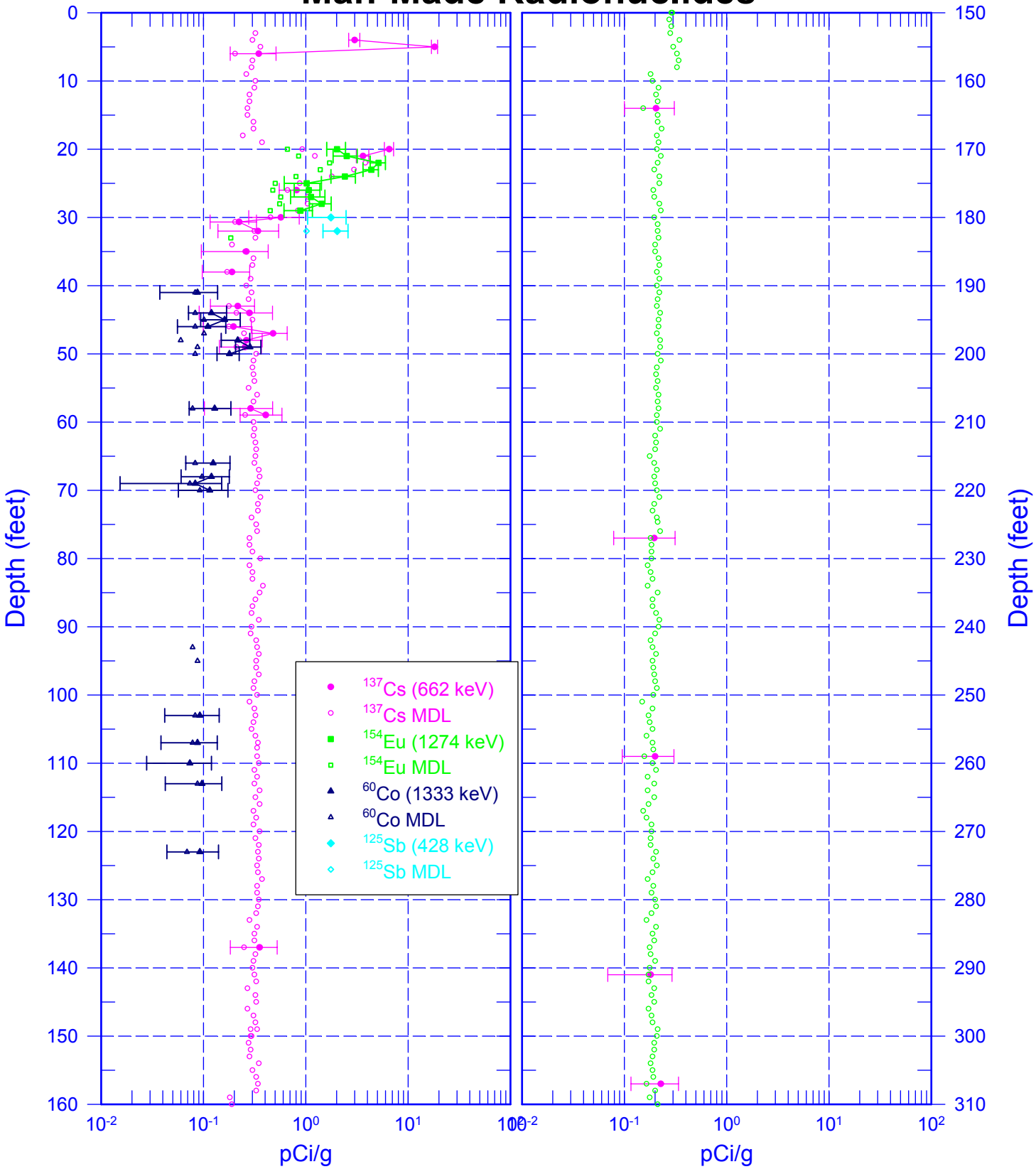
[1] GWL – groundwater level
[2] N/A – not applicable

299-E13-07 (A5855)

Man-Made Radionuclides



Zero Reference - Top of Casing

Last Log Date - 10/28/04

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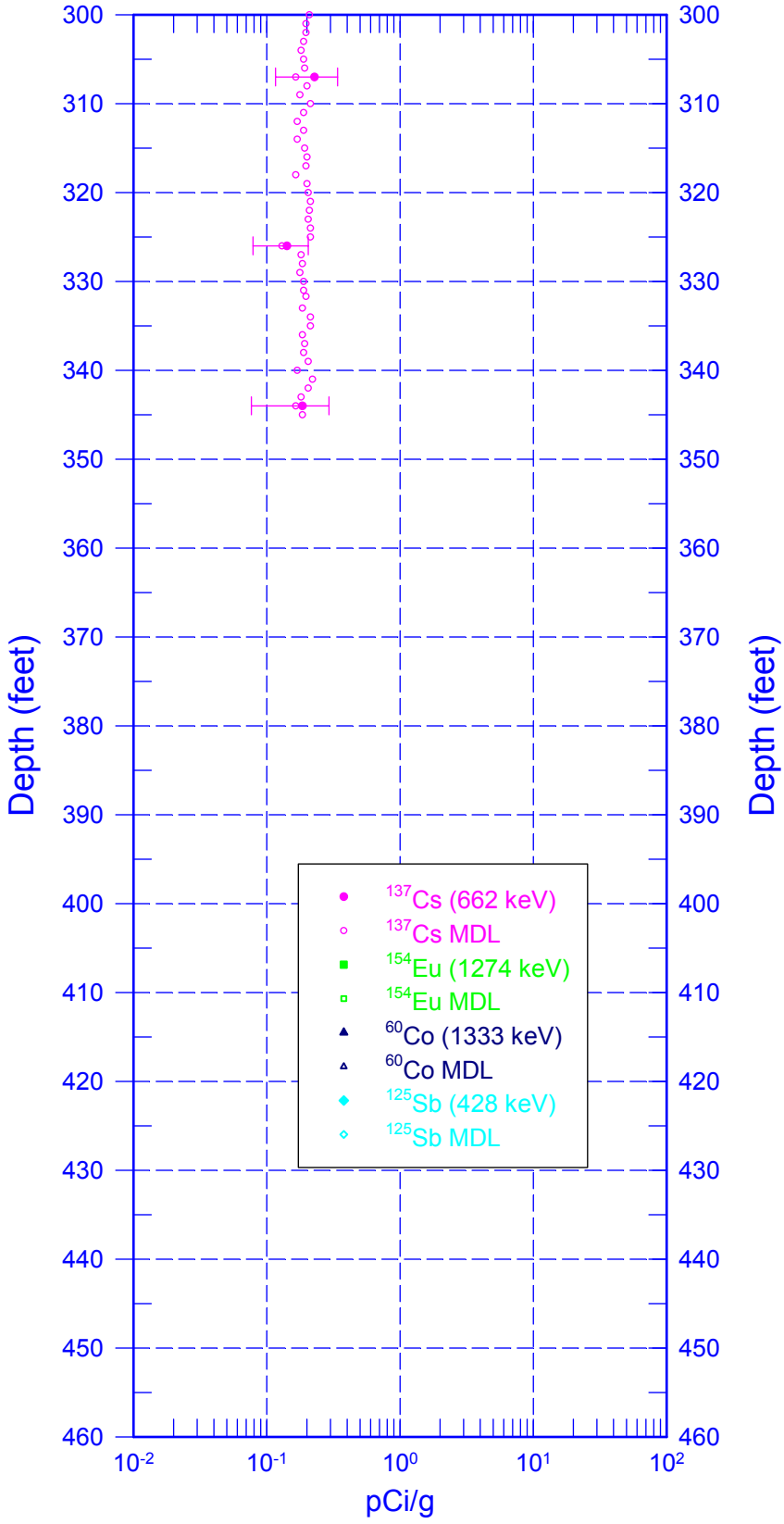
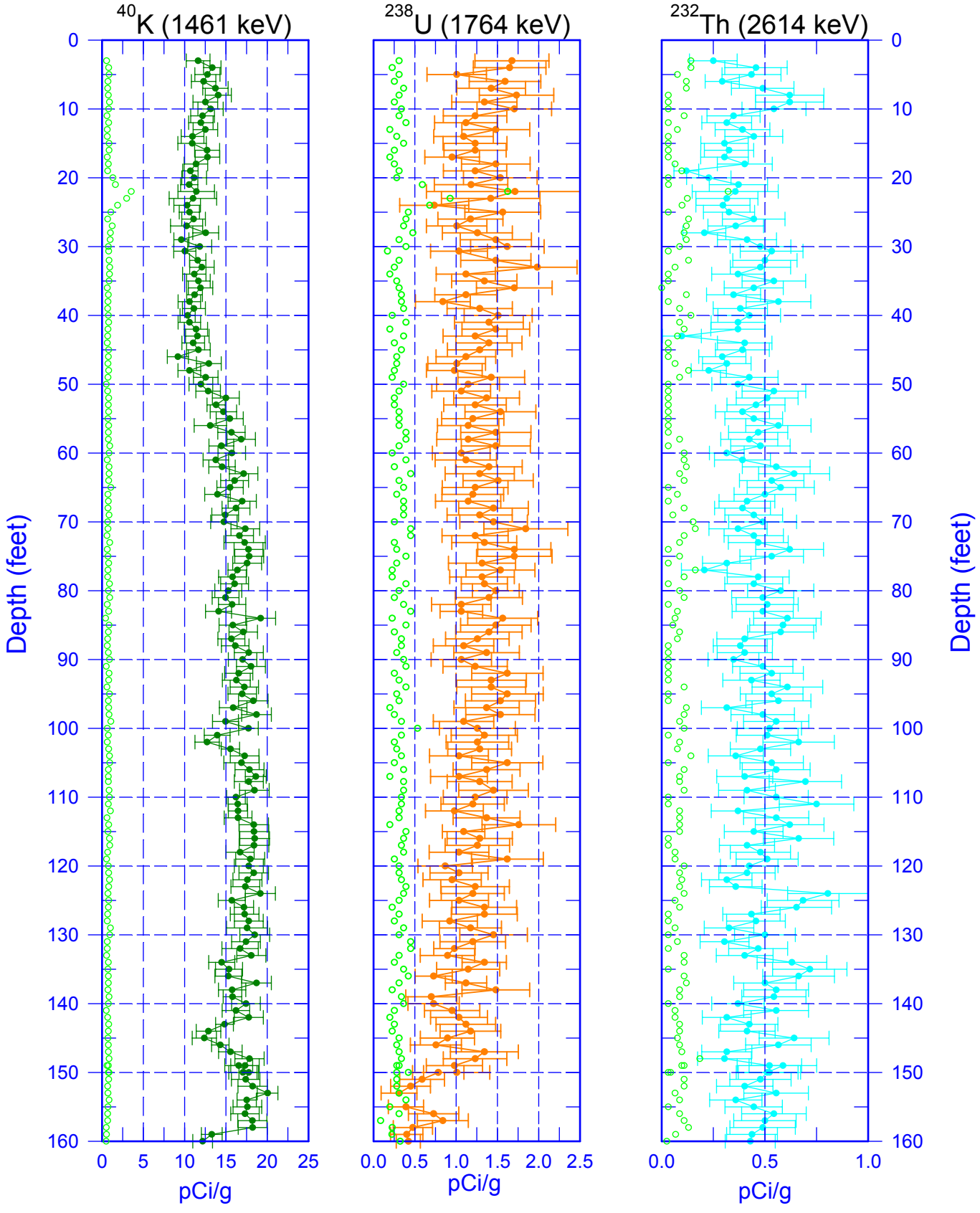
Man-Made Radionuclides



Zero Reference - Top of Casing

Last Log Date - 10/28/04

299-E13-07 (A5855)
Natural Gamma Logs

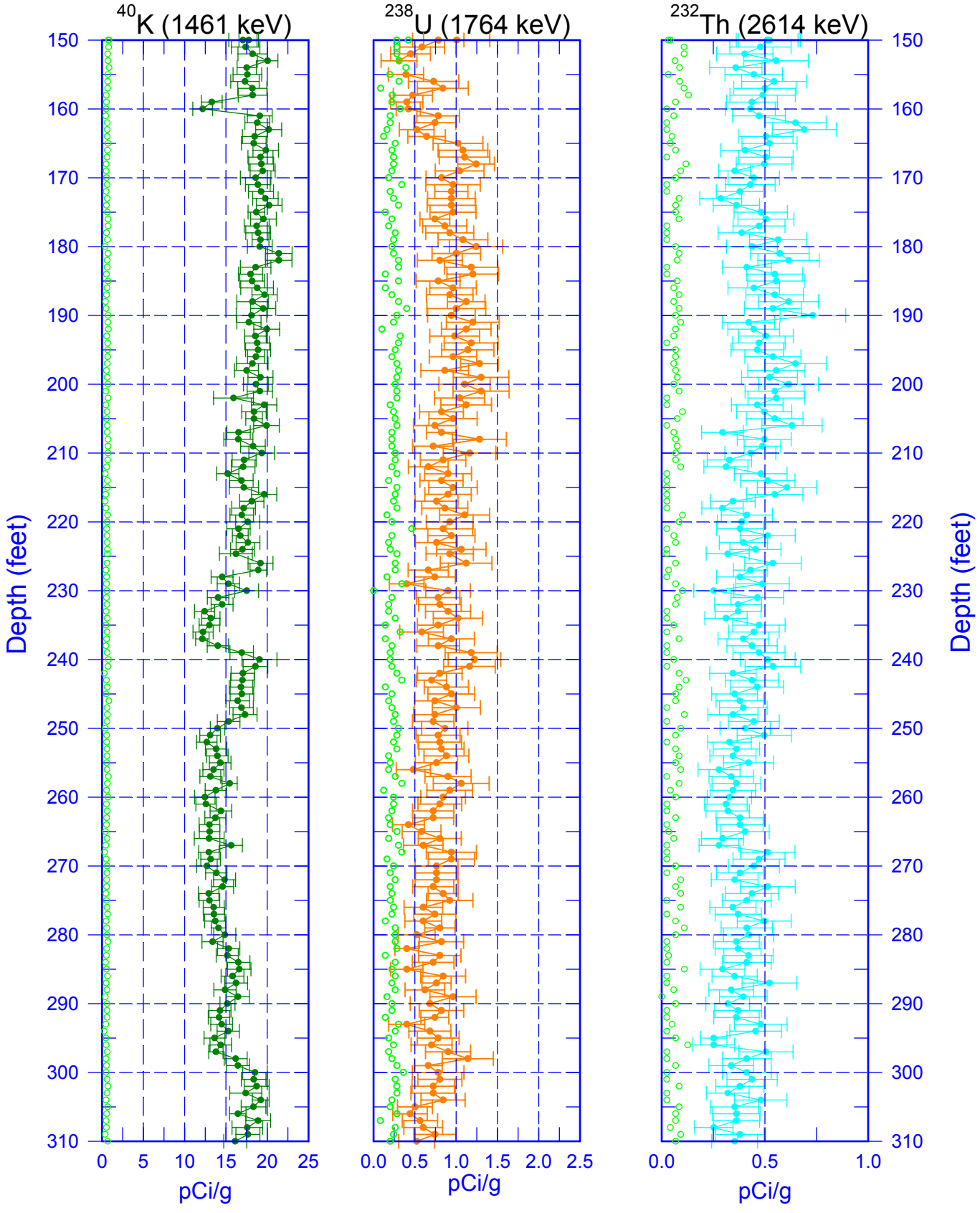


Zero Reference = Top of Casing

MDL

Last Log Date - 10/28/04

299-E13-07 (A5855)
Natural Gamma Logs

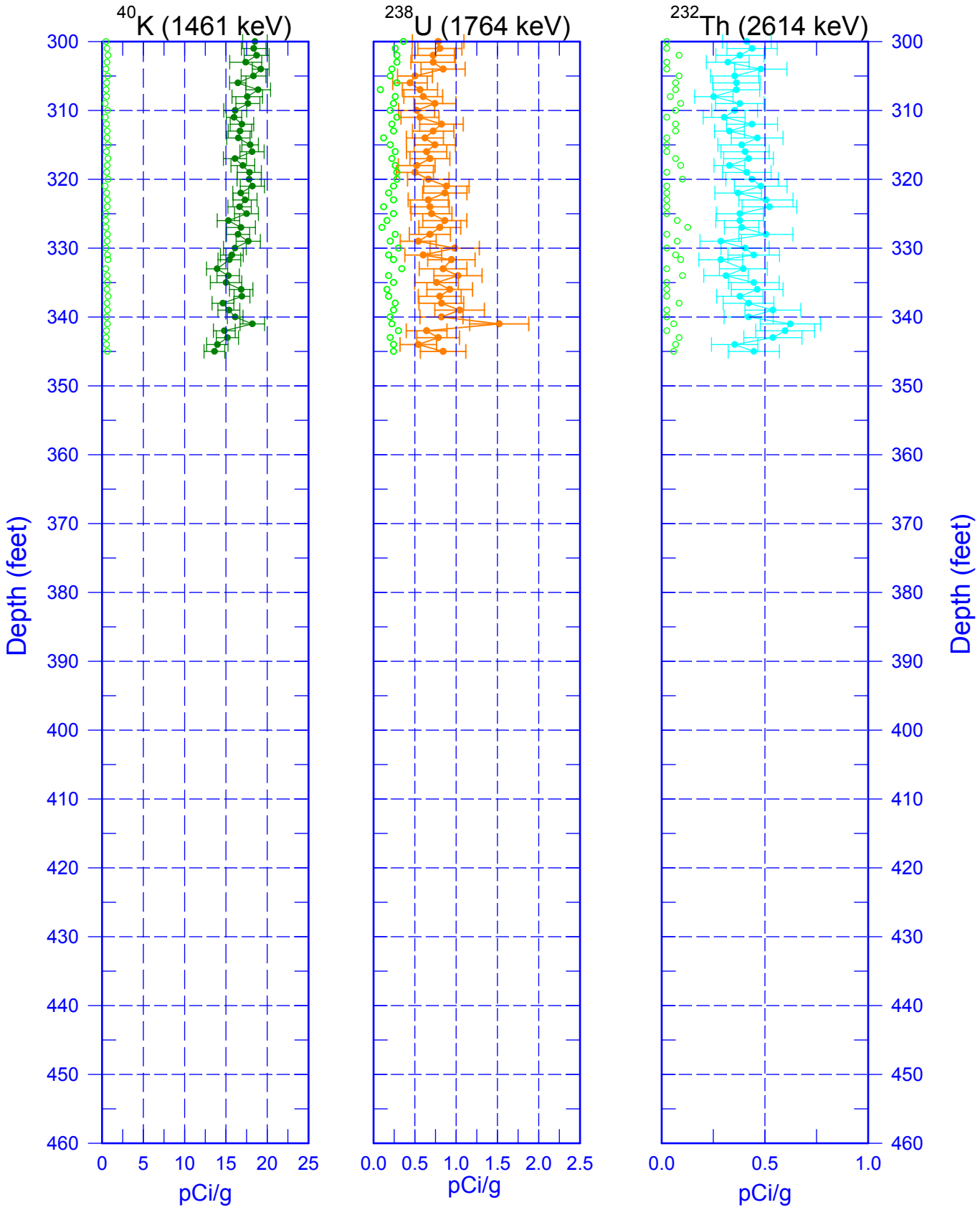


Zero Reference - Top of Casing

MDL

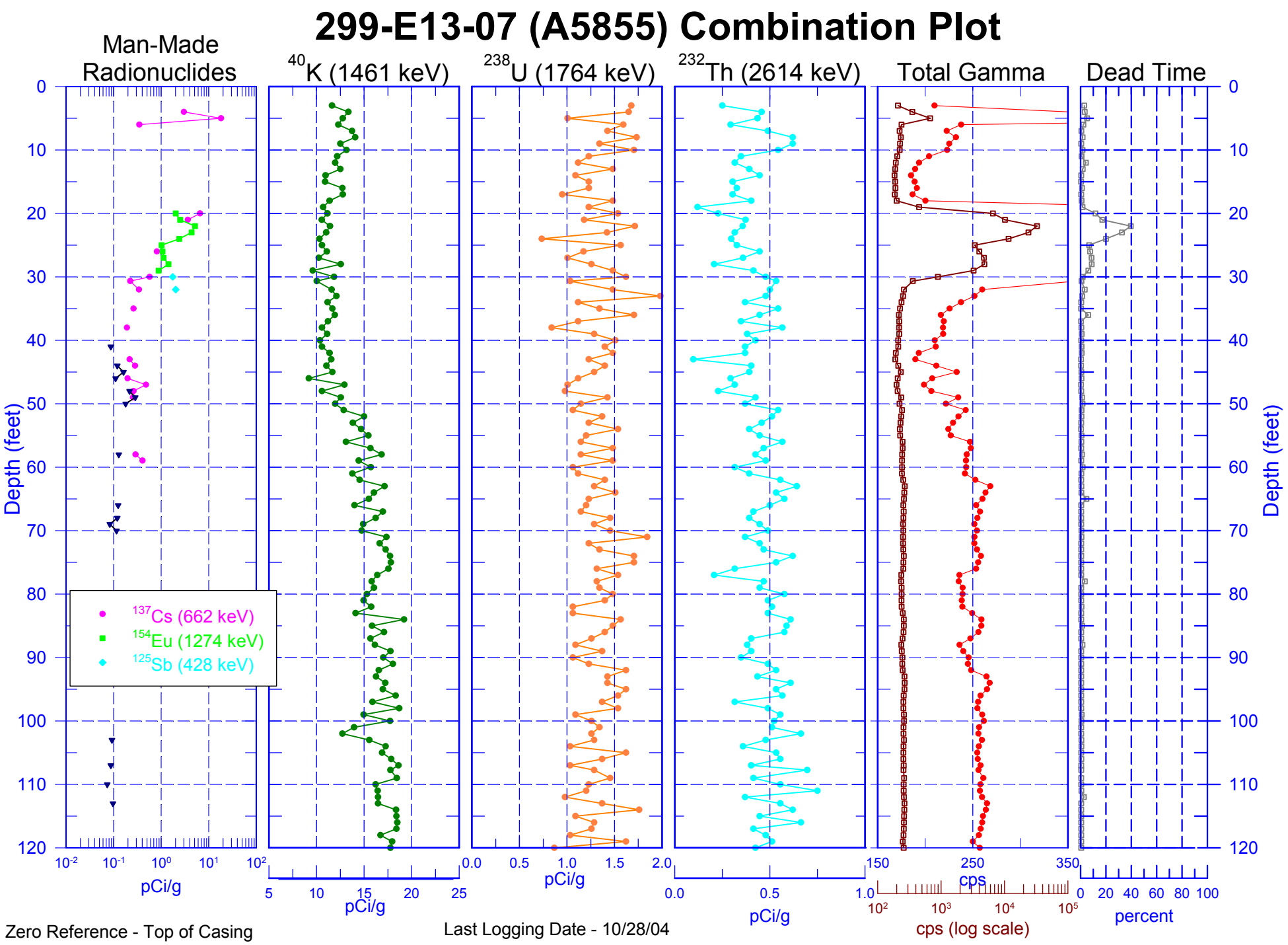
Last Log Date - 10/28/04

299-E13-07 (A5855)
Natural Gamma Logs

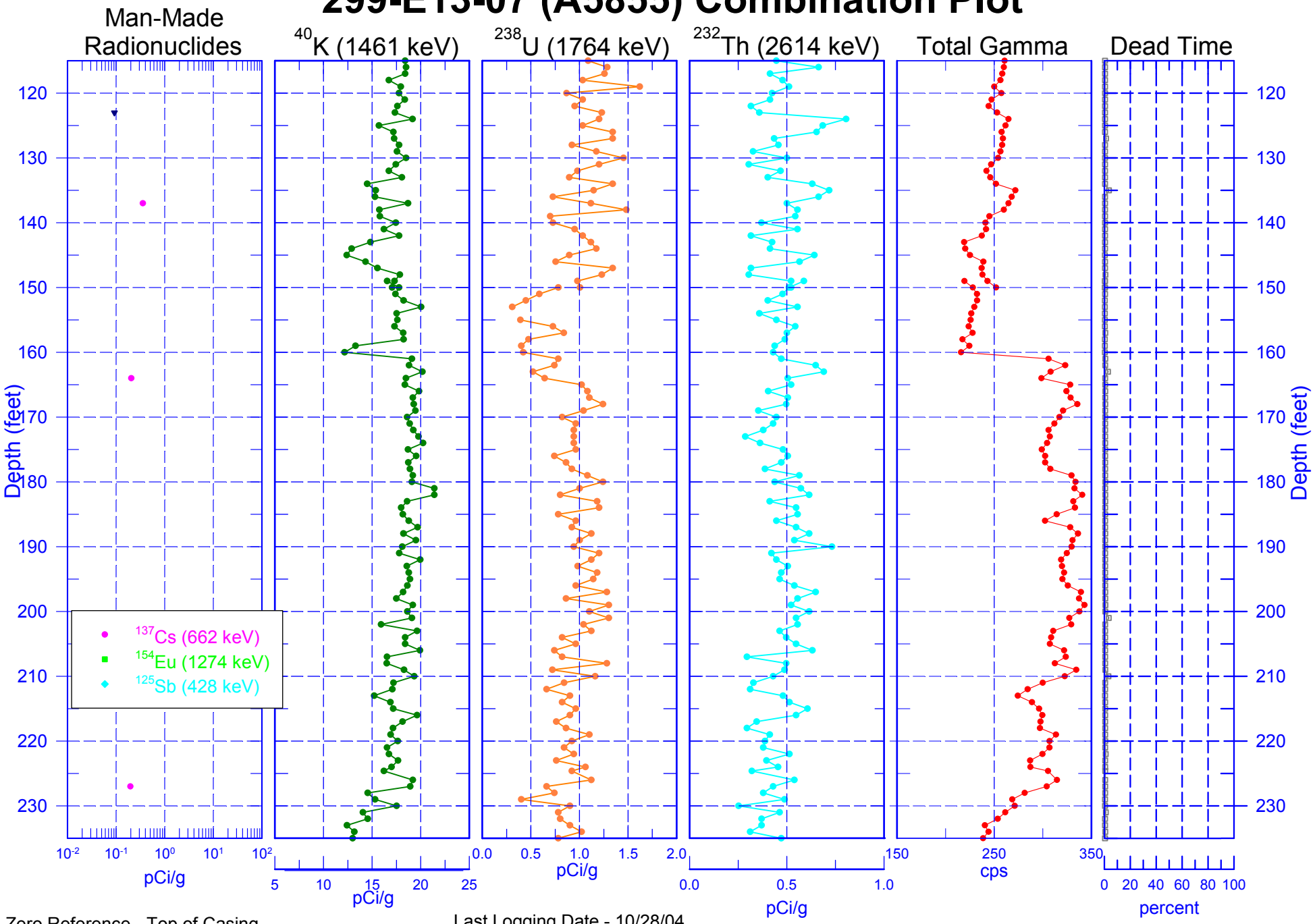


Zero Reference - Top of Casing

Last Log Date - 10/28/04


299-E13-07 (A5855) Combination Plot
Man-Made Radionuclides
40K (1461 keV)
238U (1764 keV)
232Th (2614 keV)
Total Gamma
Dead Time
Depth (feet)
137Cs (662 keV)
154Eu (1274 keV)
125Sb (428 keV)
pCi/g
cps
cps (log scale)
percent
Zero Reference - Top of Casing
Last Logging Date - 10/28/04

299-E13-07 (A5855) Combination Plot



Zero Reference - Top of Casing

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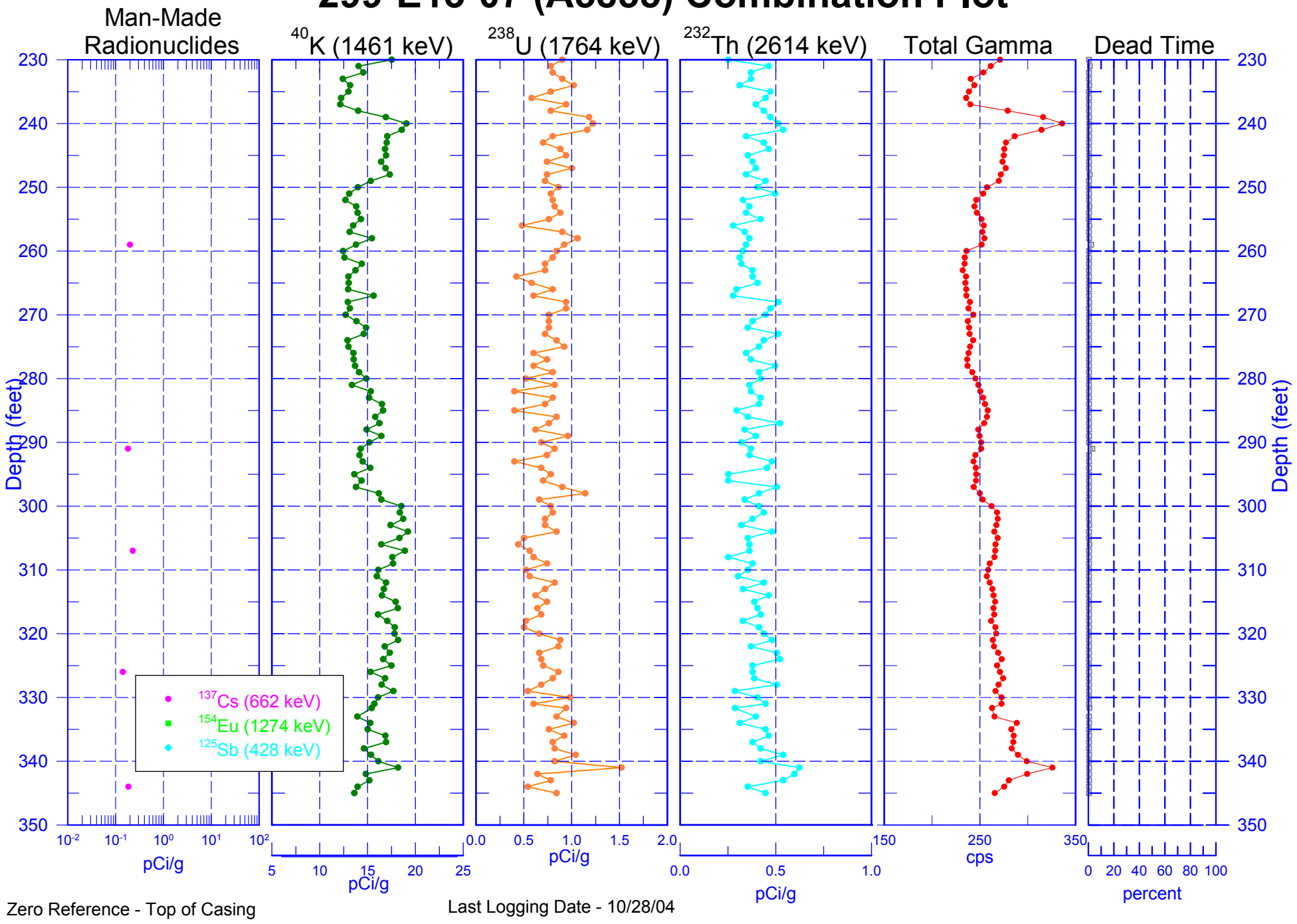
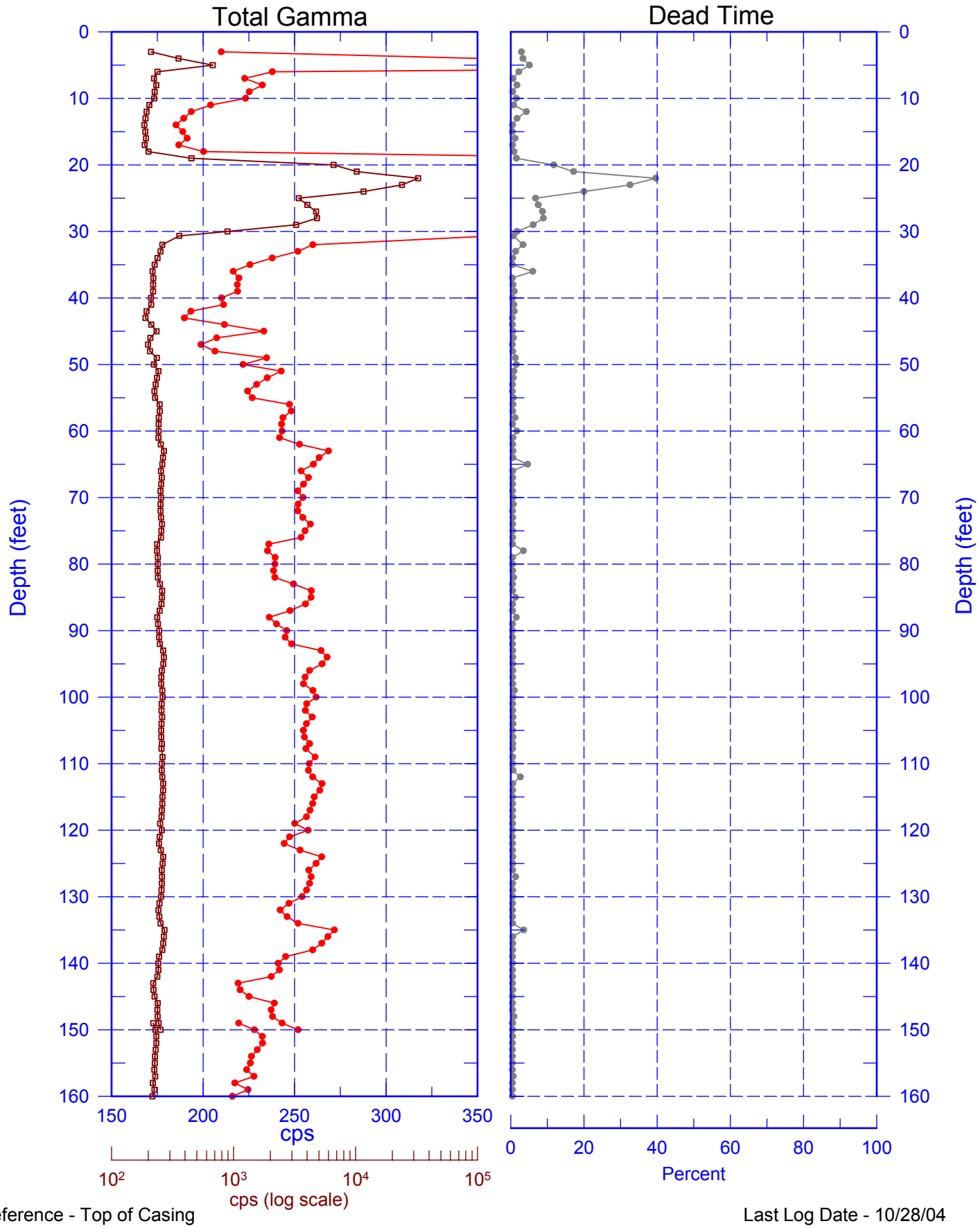


Zero Reference - Top of Casing

Last Logging Date - 10/28/04

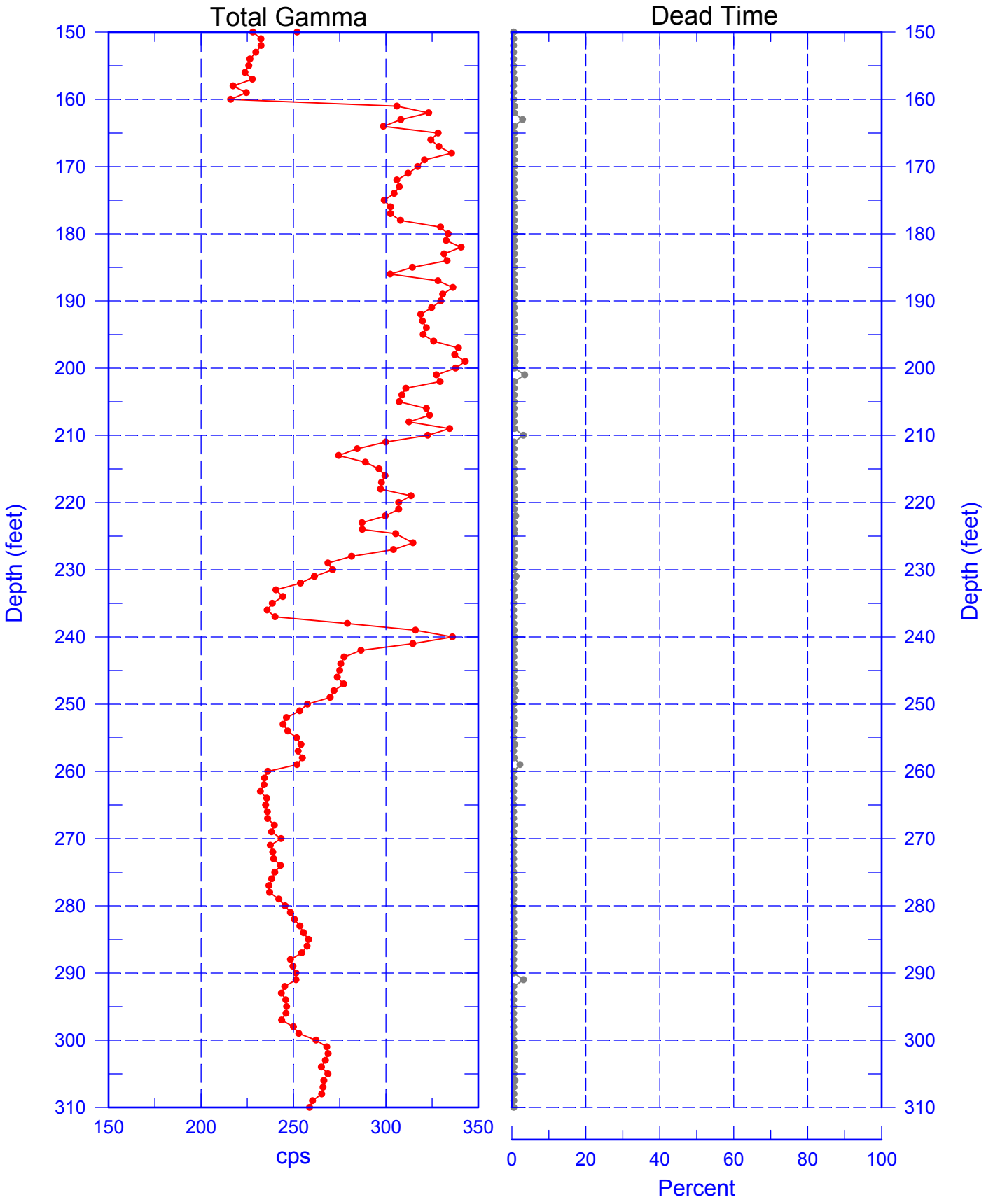
299-E13-07 (A5855)
Total Gamma & Dead Time



Reference - Top of Casing

Last Log Date - 10/28/04

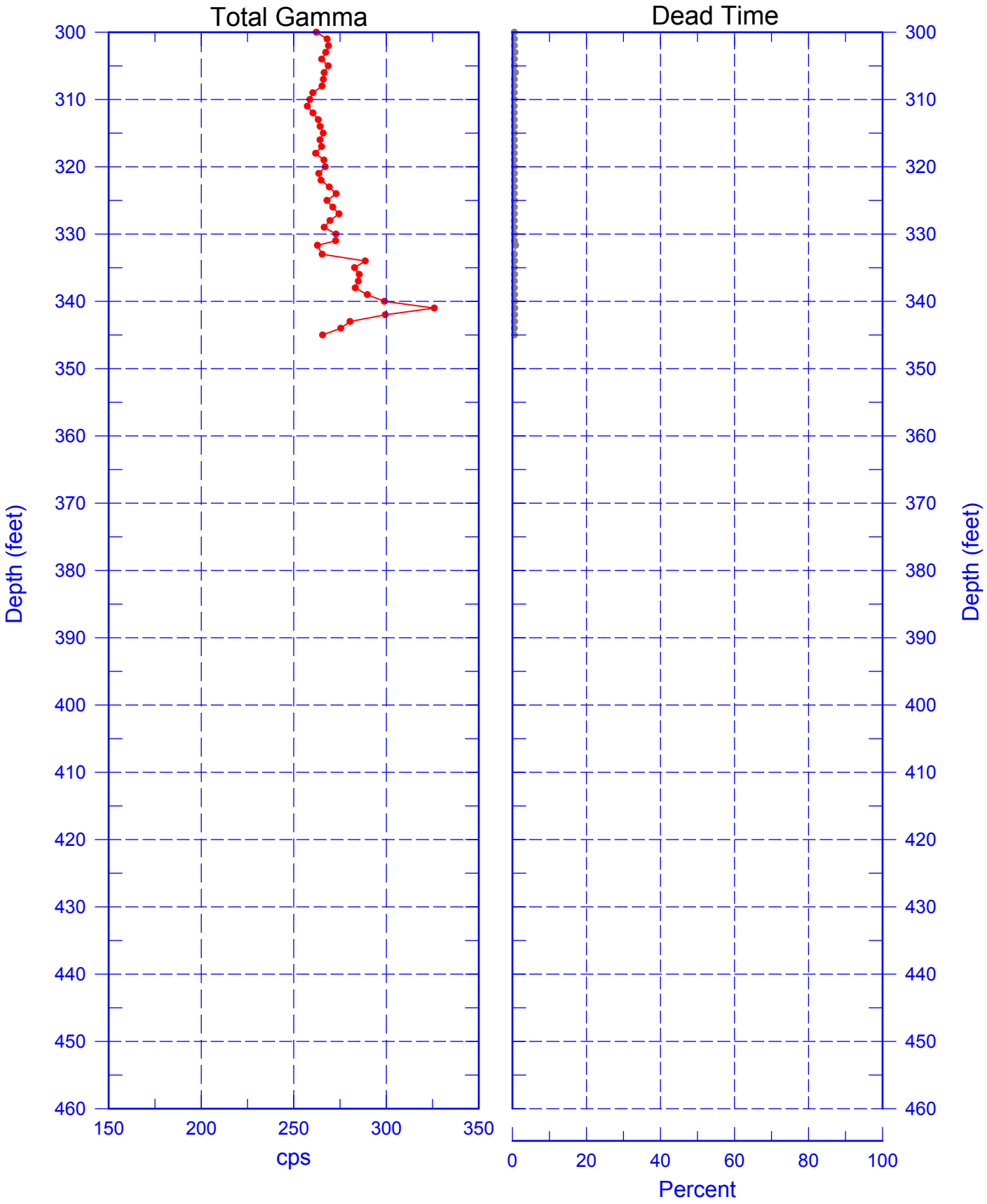
299-E13-07 (A5855)
Total Gamma & Dead Time



Reference - Top of Casing

Last Log Date - 10/28/04

299-E13-07 (A5855)
Total Gamma & Dead Time



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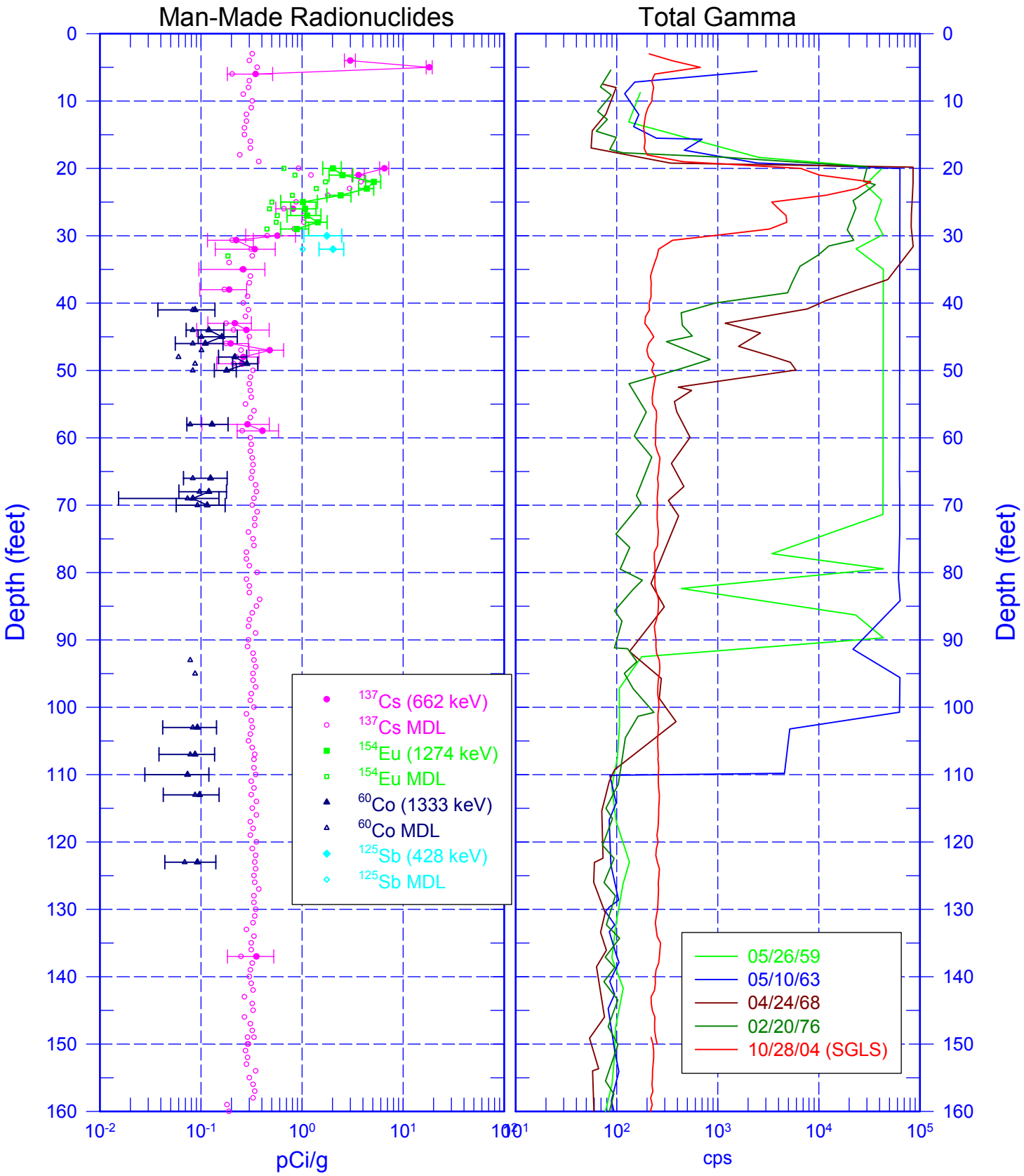

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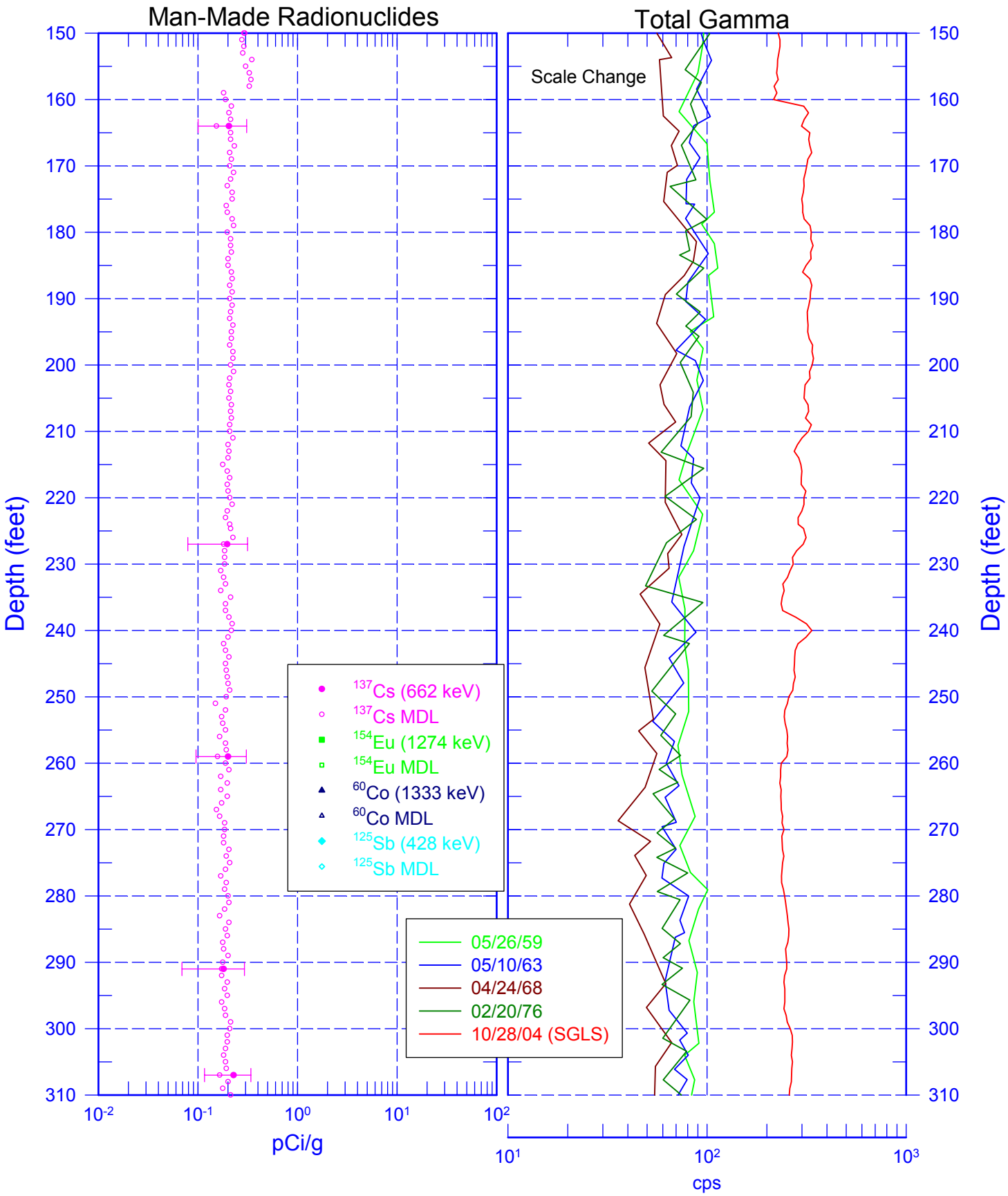

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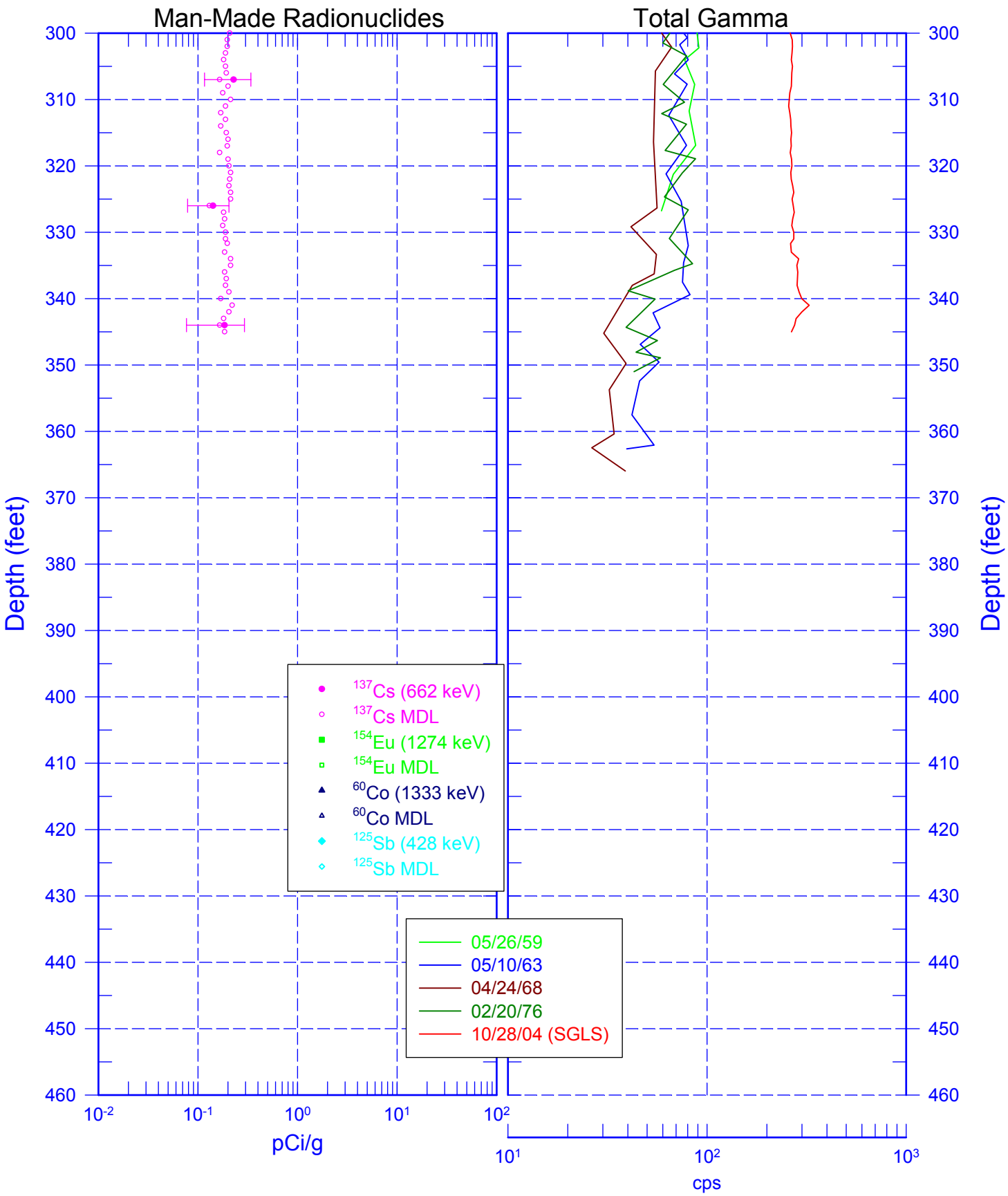

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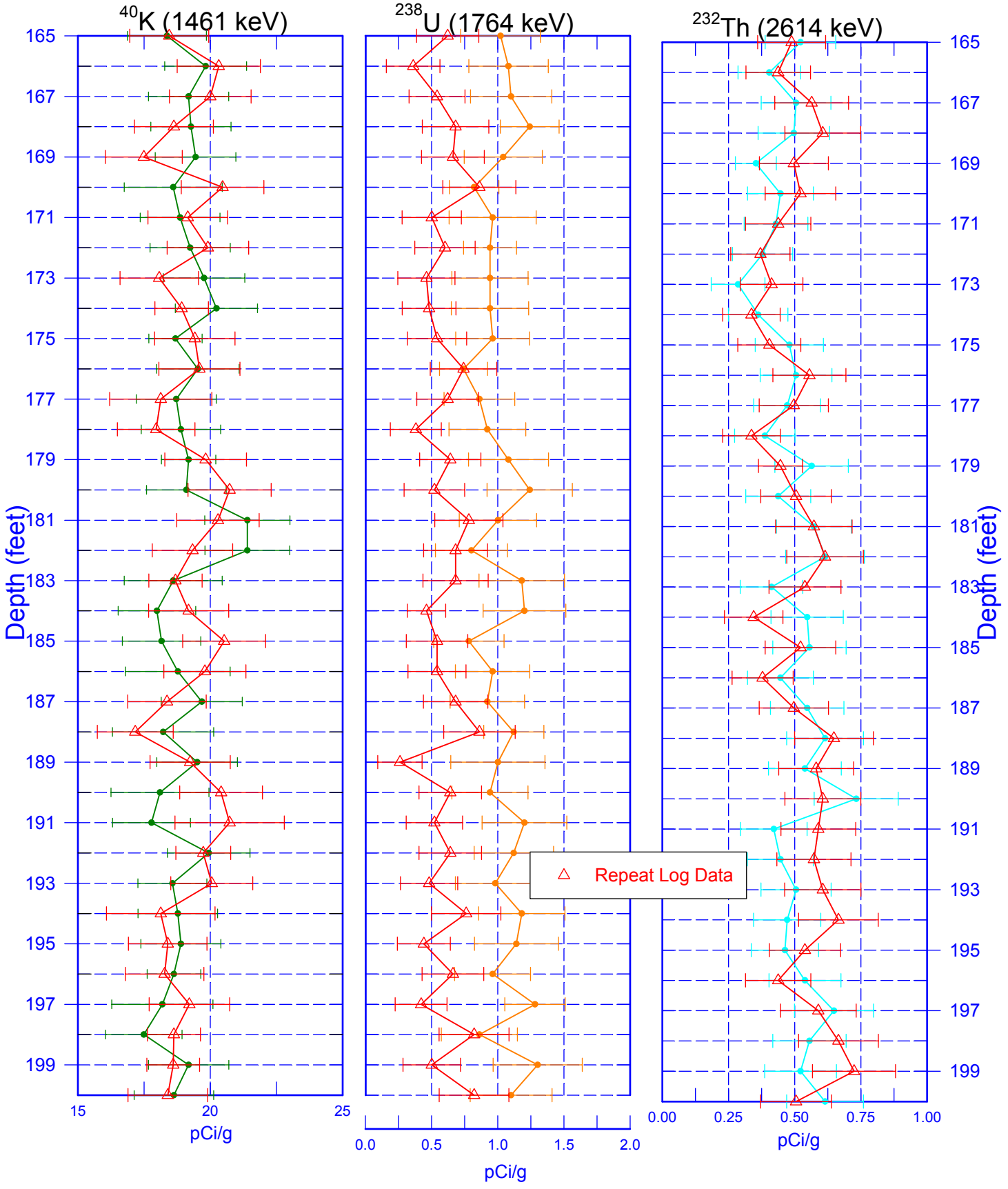
Repeat Section of Natural Gamma Logs



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